

SURVEY ON KNOWLEDGE AND ATTITUDES OF HEARING LOSS AND  
ASSISTIVE LISTENING TECHNOLOGY WITH CHILDREN

Capstone

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## Abstract

The aim of this study was to determine the level of experience obtained by classroom teachers located in Columbus, Ohio in the area of the educating children with hearing loss. Other areas of interest in the survey included the additional education regarding hearing loss in children and the willingness to make accommodations for children with hearing loss. A 35-question survey was sent to approximately 2,000 teachers in central Ohio. Questions in the survey focused on the teachers' experience with hearing loss, educating children with hearing loss and their willingness to work with students with hearing impairment. Subjects were contacted twice via electronic mail requesting their voluntary and confidential participation. Results indicated that a significant minority of respondents reported having formal education about hearing loss. In contrast, many respondents reported they had classroom experience with teaching children with hearing loss. The majority of teachers responded that they would be willing to work with students with hearing loss and make accommodations for these students. These results supported the need for communication between audiologists and teachers to promote academic success of students with hearing loss.

## Dedication

This project is dedicated to my biggest supporters; my loving parents, Terry and Judy; my amazing husband Tyler; and loyal dog Moose. Also this paper is dedicated to my inspirations in the field of Audiology; Gail Whitelaw and Christy Goodman. Without the support, guidance and reassurance from these truly amazing people I would not be where I am today. Lastly, this is dedicated to my loving grandparents who I hope are proud of me for keeping the promises I made to them and myself.

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## Fields of Study

Major Field: Audiology

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## CHAPTER 1

### Introduction

An estimated 1 to 6 infants per 1,000 are born with some degree of hearing loss and additional children with congenital progressive hearing loss may be identified later in life (Fortnum, 1997; Kemper et al., 2000; Cunningham & Cox, 2003). Children with hearing loss can have speech and language difficulties as a result of distorted or poor quality input through a degraded auditory system resulting from hearing loss. Delays are seen in the expressive and receptive language domains with a greater degree of hearing loss showing a larger delay (Shonweiler et al., 1998). These delays can lead to decreased academic achievement, which can impact the outcome of a child's life.

One of the greatest considerations for children with hearing loss is the educational impact of hearing loss on learning in the classroom and with academic success. Although children with severe and profound hearing loss are often the focus of educational concern, studies have indicated that children with slight or mild hearing loss can have academic difficulties due to their hearing loss. For example, Richburg and Goldberg (2005) demonstrated that children with minimal hearing loss (16-25 dB HL) had difficulty with reading, language, attention, communication, social and emotional function, and fatigue. Additionally, children with mild hearing loss may exhibit behavioral problems such as inattentiveness, need for frequent repetition, or inappropriate responses to instructions (Dodd-Murphy & Mamlin, 2002).

In 2009, the annual report to Congress on the implementation of the Individuals with Disabilities Education Act (IDEA) indicated that nearly 87% of students with hearing loss spend part of the day in a mainstream classroom (U.S. Department of Education, 2009). As children with hearing loss spend much of their day in the classroom, it is important to consider their listening needs compared to their normal hearing peers while in a typical school listening environment.

The possible academic difficulties that children with hearing loss can experience during their education necessitate additional support in a typical classroom setting. Children with disabilities are guaranteed the right to public education with appropriate accommodations in the least restrictive environment under the IDEA (Salathiel, Steele, & Edwards, 2010). Although the IDEA allows children to be educated in their least restrictive environment, limitations remain for children with hearing loss. For example, the listening environment can have a negative impact on speech understanding, particularly if they are to be in a typical mainstream classroom. The typical classroom may not be an acoustically favorable environment, a critical factor for children with hearing loss (Palmer, 1997). Added noise from children moving, talking and classroom noise can degrade the signal and decrease a child's ability to understand classroom instruction. This is an added challenge for all children, but specifically for children with hearing loss. Additionally, reverberation in classrooms can degrade the auditory signal and children can become more fatigued after listening in a poor acoustic environment (Palmer, 1997).

Educating children with hearing loss in the typical classroom has happened for many years and addressing the needs of these children is multifaceted. Hearing aids and cochlear implants improve the ability of the child with hearing loss to participate in their education by providing auditory input. Additionally, assistive technology such as FM systems can enhance the auditory signal by improving the signal-to-noise ratio (Anderson et al., 2005). Modifications, such as providing visual cues, providing appropriate lighting and having teachers face students can make listening in the classroom more effective for children with hearing loss and therefore be useful tools for promoting academic achievement (American Academy of Audiology, 2008; Luckner et al., 2012). Without such interventions, some children with hearing loss will continue to struggle to develop appropriate speech and language skills, adequate social skills and will have poorer academic achievement than their normal hearing peers.

A common factor in each and every aspect of the educational planning for a child with hearing loss is their teachers. Teachers play a critical role in the success of children with hearing loss in the classroom, and the needs of children with listening difficulties in the classroom require collaboration between audiologists and educators. Educational audiologists can support teachers by providing information about hearing loss, explaining devices used by students with hearing loss, and how appropriate accommodations can be made (Richburg & Goldberg, 2005). Educational audiologists are audiologists specializing in the assistance of children with hearing loss in the educational setting. The scope of practice for educational audiologists includes the organization of school hearing screenings,

providing training to educational staff about hearing loss, providing management for hearing aids and assistive technologies, and evaluating educational environment acoustics (Educational Audiology Association, 2009). While teachers are educated in the methodology of providing academic education to all students, they may lack detailed information regarding the specific needs of children with hearing loss in the typical classroom. However, with the knowledge and confidence to assist children with hearing loss in the classroom, teachers can promote academic success in this population.

While many of the classroom modifications rely on the cooperation and persistence of classroom teachers, teachers may not have the necessary education or training to understand the impact of hearing loss on a student in the classroom, farless be able to provide the appropriate accommodations or educational interventions for children with hearing loss. Teachers of the deaf or hard of hearing have educational standards and published recommendations that guide their educational process and are prepared to work with students who have hearing loss (Easterbrooks, 2008). In contrast, teachers in regular classrooms do not typically have education about hearing loss and may be unfamiliar with the negative educational consequences of hearing loss and the accommodations that can support these students. According to the Ohio Department of Education (2005), teachers are expected to plan and deliver effective instruction that is tailored to the learners needs and advances their learning, with differentiated instruction required to support needs of every study, including those identified as being gifted, those with disabilities, and those classified as at-risk. Clearly, even though this is an expectation, it

is possible that classroom teachers lack the knowledge and skill to provide this type of instruction.

Review of the curriculum for elementary teachers supports the fact that there is a lack of specific coursework to support the special needs for children with disabilities and specifically hearing loss. A review of three accredited Ohio schools offering degrees in early and/or middle childhood education revealed minimal coursework in the area of education children with disabilities or additional academic needs. For example, the Bachelor of Science degrees in early and middle childhood education at the University of Cincinnati requires courses in teaching in inclusive classrooms as part of the degree requirements. The Bachelor of Science degrees in early and middle childhood education at Ohio University require courses focused on teaching children with exceptionalities for both middle and early education majors. Finally, the Bachelor of Science in Education for early or middle childhood education at the Ohio State University requires education majors take introductory courses regarding special education and exceptional children. This coursework can provide an overview for working with “exceptional children” however is not likely to focus on hearing loss or provide a foundation for teachers working with students with hearing loss.

There is a lack of current research assessing teachers’ knowledge and experience regarding the needs of students with hearing loss in the typical classroom. The purpose of this study was to measure the knowledge, perceived skill and experience of teachers in the mainstream classroom who have worked with students with hearing loss. Willingness

to work with students with hearing loss and perceived need to obtain additional information about hearing loss was also evaluated. The final objective of the study was to identify areas for collaboration and education between audiologists and teachers in order to promote the best academic environment and outcomes for children with hearing loss. The following questions were the main objectives of this study:

1. How often do mainstream teachers receive education about hearing loss and children with hearing loss and where do they receive the information?
2. How familiar are teachers with aspects of hearing loss and classroom modifications that can potentially enhance the listening environment for children with hearing loss?
3. Are teachers willing to work with students with hearing loss and make classroom modifications to promote listening in the classroom? Are they also willing to obtain additional information about hearing loss and children with hearing loss through a seminar or teacher in-service?

## CHAPTER 2

### Literature Review

Based on review of the literature, the academic difficulties secondary to hearing loss have been well documented, as have been the effectiveness of assistive technology (hearing aids, cochlear implants and FM systems) and efficacy of additional classroom modifications to decrease the degradation of auditory stimuli for listeners with hearing loss. This is an important issue due to the number of school aged children with hearing loss.

In 2009, the Centers for Disease Control reported that 1.4 in 1,000 babies were born with hearing loss based on the results of universal newborn hearing screening. Higher estimates have reported permanent bilateral hearing loss to be present in 3-4 of 1000 infants born in the United States and with more infants and children developing later onset hearing loss (Buchman, Adunka, Zdanski, & Pillsbury, 2011). For example, late onset moderate hearing loss is diagnosed in 1.2-3.3 per 10,000 school aged children (Fortnum, 1997). Additionally, an estimated 12.5% of children age 6-19 have at least a mild hearing loss at 6 KHz (Niskar et al., 2001).

Once hearing loss is identified, early intervention efforts are directed at ameliorating possible developmental, learning, and social deficits that might result from hearing loss (Yoshinaga-Itano, 2011). These early intervention efforts have focused on improving communication and educational outcomes for children with hearing loss

(Meinzen-Derr et al., 2011), and may include fitting of amplification and the development of listening and/or communication skills.

Despite these early intervention efforts, children with hearing loss may still enter the school with significant challenges related to language, communication and listening. The possible negative effects of hearing loss can become evident as these children can struggle academically since children with hearing loss generally do not begin school with the same level of language skills as their hearing peers (National Association of State Directors of Special Education, 2006). This initial deficit in language skills leads to a reduced vocabulary development, which is necessary for building reading skills and enhancing academic performance (Traxler, 2000; Luckner & Cooke, 2010). As language and reading skills are essential for academic success, these two areas can have negative impacts on overall academics and learning for children with hearing loss. Children with hearing loss also gain new word knowledge at a slower rate than their normal hearing peers and have a smaller range of contexts within their range of knowledge (Luckner & Handley, 2008). Overall reduced vocabulary knowledge can lead to difficulty understanding academic content and negatively impact academic success. Children with hearing loss may also lack background knowledge, which can be linked to achievement as background knowledge provides the foundation for which learning of new concepts is based (Dochy et al., 1999). This lack in background knowledge noted in children with hearing loss due to their reduced incidental learning, limited experiences with the topics,



and reduced time spent reading can lead to difficulty understanding new academic topics or concepts (Luckner et al., 2012).

For children to learn in a typical classroom environment, they must be able to clearly and accurately hear the teacher's instruction. In addition to added difficulty from hearing loss, the typical classroom generally does not provide a favorable listening environment for learning (Palmer, 1997; Knecht et al., 2002). Erber (1982) proposed levels of auditory skill development that are related to hearing and listening. The levels build upon the each other and are 1) Detection, 2) Discrimination, 3) Identification and 4) Comprehension. Detection is the first level and represents the ability to note the presence or absence of sound. Discrimination represents distinguishing between two speech sounds and identification involves recognizing a target word from an infinite amount of possibilities. Finally, comprehension involves understanding of auditory information, represented by following directions or holding conversations. It is essential to note that each level is dependent on the development of the skill before it. Comprehension can represent learning in the classroom and comprehension cannot be achieved without detection (Erber, 1982). If the acoustic environment of the classroom does not facilitate access to sound, detection will be impacted and it will be nearly impossible for the child to be able to use that information for "higher level" listening and processing skills. Although this is true for all children, it is particularly critical for the child with hearing loss in the classroom.

The impact of poor classroom acoustics on listening has been well documented (Crandell & Smaldino, 2000). The American National Standards Institute (ANSI) has published recommended standards for classroom acoustics with a focus on three measures: background noise (measured in dBA), reverberation time, (measured in msec) and signal-to-noise ratio (focusing on the intensity of the target signal compared to background noise) (ANSI, 2002). These standards were designed to ensure appropriate classroom acoustics are being met in order to enhance listening and learning for all students. Background noise is represented by any noise that could conflict with the desired auditory signal of the teacher's voice. Examples of noise include heating or cooling systems, children talking or moving, noise in the hallway or outside a window, and computer or other electronic noises. Signal-to-noise ratio represents a value related to the desired signal (teacher's voice) in relation to the surrounding background noise. Less noise results in a higher signal-to-noise ratio and improved speech understanding. Reverberation time refers to the amount of time a sound lingers in the classroom as it bounces off surfaces before the sound dissipates. As a sound continues to reverberate throughout the room it can interfere with the desired speech signal of the teacher providing instruction. Although individuals with normal hearing require a signal-to-noise ratio of about +6 dB, the child with hearing loss requires a more favorable signal-to-noise ratio of nearly +20 dB for speech understanding (Crandell & Smaldino, 2002). ANSI updated the classroom acoustic standard in 2010, resulting in S12.50-2010. The updated ANSI standard addresses that unoccupied classroom noise level must be no more than 35

dBA, reverberation time must not more than 0.6 seconds in classrooms smaller than 10,000 cubic feet or 0.7 seconds in classrooms between 10,000 and 20,000 cubic feet, and that the signal-to-noise ratio should be at least +15 dB at the child's ear level. Some studies have suggested that the background noise in typical classrooms do not meet these requirements and have been found to be 40 to 66 dBA and signal-to-noise ratio of +4 dB to 11 dB (Crandell & Smaldino, 2002; Knecht et al., 2002). Another study by Sato & Bradley (2008) indicated that in elementary classrooms near Ottawa, Canada students experienced noise levels of 49 dBA on average and a mean signal-to-noise ratio of +11 dBA. It should be noted that compliance with the ANSI standard for classroom acoustics is voluntary.

Degradation in auditory input can be problematic for children with hearing loss as it can interfere with their ability to detect the auditory input of their teacher's instruction. As reported by Erber (1982) comprehension cannot occur without detection. Even if the teacher's voice is detected, the child may not hear the instructions correctly. Finitzo-Hieber and Tillman (1978) reported that children with mild to moderate degrees of sensorineural hearing loss demonstrated poorer speech perception, even in a simple task such as repeating monosyllabic words, than their normal hearing counterparts under multiple listening situations. For example, in a favorable condition with +12 dB signal-to-noise ratio and 0 second reverberation time, the group of children with normal hearing achieved an average speech perception score of 89.2% while the group of children with hearing loss achieved an average score of 70%. Addressing listening in a much poorer

condition of 0 dB signal-to-noise ratio and reverberation time of 1.2 seconds, the group of children with normal hearing achieved an average score of 29.7% and the group of children with hearing loss achieved an average score of 11.2%. Although these differences are not statistically significant using critical difference values published by Carney & Schlauch (2007), they are certainly clinically significant in speech perception measures. Crandell (1993) reported similar results in children with minimal sensorineural hearing loss, defined as having pure tone average from 15 to 25 dB. This study investigated speech perception using sentence materials in the presence of multi-talker babble as background noise in different signal-to-noise ratio levels of +6, +3, 0, -3 and -6 dB and compared performance of the students with minimal hearing loss to that of their normal hearing peers. With a signal-to-noise ratio of +6 dB both groups achieved speech perception scores above 80%, but when the signal-to-noise ratio was -6 dB, the group with minimal hearing loss had a score of less than 50% and the group with normal hearing had scores of 75%. This reduced speech understanding can negatively impact a child's ability to learn effectively in the classroom and plays a role in their academic success.

With the impacts of hearing loss and poor classroom acoustics as potential obstacles to learning, children with hearing loss generally need additional accommodations in the classroom to insure instructions and lessons are heard appropriately to promote learning. Accommodations such as an FM system have been shown to provide measurable benefit in the classroom for students with hearing loss. An

FM system involves the use of a transmitter microphone worn by the teacher and a receiver which is either a speaker in the case of soundfield FM or a small receiver attached to the student's hearing aids in the case of personal FM systems (Thibodeau, 2010). The teacher's voice is then transmitted to the speaker or to the child's hearing aids. A study by Anderson et al., (2005) explored the benefit of the use of FM systems in typical classrooms. In this study, children with hearing loss ranging from mild to profound were placed in a typical classroom setting and required to repeat Hearing In Noise Test( HINT) sentences while using amplification devices and FM systems. Soundfield FM, desktop FM, and personal FM systems were tested to determine benefit of each type of assistive technology. Results indicated a small improvement (5%) in speech recognition scores from 11 of the 28 participants using classroom soundfield when compared to their hearing aids or cochlear implants alone. All of these 11 participants received more improvement in speech recognition using desktop and/or personal FM (12% to 32%) when compared to soundfield FM. There was not a significant difference between the use of desktop FM over personal FM, though personal FM systems were preferred by the majority of teachers and students. This improved speech understanding with the use of FM systems supports their use by children with hearing loss in the classroom as speech understanding is essential for learning and academic achievement.

Advances in FM technology have shown additional benefit of adaptive FM in the classroom and everyday listening situations (Thibodeau, 2010). Adaptive FM maintains

the desired signal-to-noise ratio by adjusting the output of the FM signal based on the ambient noise in the room. For example, as the background noise in a classroom increases, the signal of the teacher's voice delivered to the child's hearing aids also increases to maintain the desired signal-to-noise ratio. Traditional FM does not adjust output based on background noise and the signal remains the same level regardless of the level of background noise. This research study investigated five student and five adult hearing aid users with moderate to severe hearing loss performance on speech recognition testing in noise with standard FM and adaptive FM. Participants showed a significant benefit using the adaptive FM as background noise increased. For example, performance was measured using the Speech Perception in Noise (SPIN) and participants were found to achieve higher scores on predictable sentences in higher levels of background noise with adaptive FM than with traditional processing FM technology. An improvement of 4% was noted in background noise of 63 dBA and 42% in background noise of 73 dBA when using the adaptive FM compared to traditional processing FM technology. Participants also indicated a preference for the adaptive FM in 100% of classroom situations they were tested in. The improvement noted in increasing background noise and user preference for adaptive FM suggested increased benefit with the use of adaptive FM which could be generalized to the classroom. Improved speech perception in the classroom could lead to improved academic achievement of children with hearing loss in the classroom.

In addition to assistive technology use, teachers can promote learning in students

with hearing loss with additional teaching techniques. Luckner et al. (2012) suggested that teachers provide instruction using concrete activities such as pre-teaching, engagement, linking, modeling and direct instruction to overcome the language, vocabulary and literacy delays seen in children with hearing loss. Pre-teaching refers to a review of material to be learned as well as key concepts/terms to be used in a lesson. Engagement includes conducting brief and informal conversations with students focusing on ideas or information contained in the reading. Linking refers to the process of using students' own experiences and relating it to the information in their reading materials to make comparisons. Modeling refers to teachers voicing their own thinking process as they make inferences about concepts and how they determine if they are correct. Finally, direct instruction is used with sight words, root words, and reading techniques. To overcome the gaps in background knowledge seen in children with hearing loss, graphic organizers, blogs throughout the study of a certain topic, and virtual experiences or group discussions were suggested. Furthermore, vocabulary identification before the initial instruction and checking understanding during instruction can be beneficial. Providing students with individualized learning strategies was also suggested. For example, Richards (2003) suggested the use of the *Read, Cover, Retell, Check* (RCRC) program that requires children to check their understanding as they move throughout the text. This program encourages children to read a small amount of the material, place a cover over the material, retell themselves what they have read, and finally check to see if they remembered correctly. These types of teaching strategies can be implemented in the

classroom and compliment the use of assistive technology to support learning for children with hearing loss.

With the possible negative effects on academics caused by hearing loss and the positive impact that accommodations to enhance learning in the classroom can have, it follows that teachers should have the education necessary to provide appropriate education and support to these students. However, few research studies have addressed the topic of educator knowledge regarding children with hearing loss. Perhaps it is assumed that with the growing need to accommodate children with disabilities in the mainstream classroom, teachers would have the necessary knowledge to educate children with hearing loss. However, taking for granted that teachers are prepared to provide the necessary accommodations for children with hearing loss could be detrimental to the education of these students. Without the necessary teacher knowledge of the impact of hearing loss on listening and learning in the classroom, students with hearing loss may fail to reach their academic potential, which may have far reaching and lifelong impact. Education, in general, provides the foundation for the rest of one's life. A study by Ross & VanWilligen (1997) addressed formal education and subjective quality of life, based on the results from two national samples collected in 1990 and 1995. Results of this study indicated that higher levels of education (measured in years of formal education) were related to a higher quality of life. Subjective quality of life was represented by lower levels of emotional distress (anger, depression and anxiety) and lower levels of physical distress (malaise and aches or pains). Thus, the importance of a strong



educational foundation is clear in terms of setting the stage for a successful and productive life for all children. However, this may be even more critical for children with hearing loss due to their additional needs for communication and academic accommodations.

Early studies surveyed teachers about their experience and education related to students with hearing loss and found that only a small percentage of teachers received formal education related to hearing loss and its impact on education (Lass et al., 1985; Lass et al., 1990; Blair et al., 1999). Lass et al. (1985) surveyed 98 general education classroom teachers and found that only 37.8% had received some type of instruction on hearing loss during their formal University education. Another study indicated a similar lack in the knowledge of 89 health education teachers regarding hearing, hearing loss, and hearing health practices (Lass et al., 1990). These teachers reported a lack in knowledge regarding hearing loss and the damaging effects of noise on hearing.

Another study focused on information provided to teachers about students with hearing loss and found that their knowledge was insufficient (Blair et al., 1999). The teachers in this study had communication from the audiologist to the school via reports sent at least annually to the student's school file. Of the 273 teachers that responded to the survey, only 74% reported that they were aware of their student's hearing impairment, despite the fact that audiologic information related to hearing loss was available in each student file. Teachers in this study reported they were nearly as likely to get information regarding the student with hearing loss from another source as they

were to obtain it from the audiologist. Additional sources of information included parents, speech-language pathologists, and the students themselves. About half of the teachers reported that they did not see the audiological reports and just under half who reported were aware of the results indicated that they found the information difficult to understand. This study highlighted the need to ensure that audiologists are providing teachers with accurate and clear reports that include recommendations for educational accommodations to promote learning in a manner that they can easily and effectively access. The researchers suggested that a “teacher’s report” with clear instructions and without technical jargon be provided to the classroom teacher working with a child with hearing loss. Additionally, they suggested a system to ensure each teacher receives the reports intended for them, such as a receipt returned to the audiologist from the teacher of the child with hearing loss.

Another study addressed teachers’ knowledge of and opinions toward minimal hearing loss (Richburg & Goldberg, 2005). This study evaluated teachers’ perception of five myths about minimal hearing loss; 1) minimal hearing loss does not exist, 2) students with minimal hearing loss will be identified through school hearing screenings, 3) if students with minimal hearing loss pass a school hearing screening then they will not have difficulty in the classroom, 4) preferential seating is enough of a classroom modification for students with minimal hearing loss and 5) hearing conservation programs are not necessary for students. The results indicated that the majority of teachers reported that minimal hearing loss does exist, that students with minimal hearing

losses would not be identified through hearing screenings, that minimal hearing loss can have a negative impact on learning in the classroom, and that exposure to noise can lead to hearing loss. A limited number of teachers responded that they disagreed with the myth that preferential seating is enough of an accommodation in itself. These results demonstrated that although the majority of teachers reported that they understood the main concepts there is room for improvement, particularly regarding the myths that minimal hearing loss could be identified through school screenings and the use of preferential seating would be a sufficient accommodation for children with hearing loss. For example, 31% of the 45 teachers surveyed reported that they “disagreed” or “strongly disagreed” with the myth that preferential seating alone represents appropriate accommodations for students with hearing loss, 36% agreed with this myth and 33% had no opinion on this myth. These are areas where educational audiologists can provide additional information to mainstream teachers to improve their understanding regarding hearing loss and the necessary classroom accommodations for children with hearing loss.

A more recent study examined teachers’ perception of hearing assistive technology and its use in the classroom via cross-sectional survey of teachers of deaf or hard of hearing students in the kindergarten classroom (Nelson et al., 2013).

Respondents were preschool teachers who were employed in a specialized program for children with hearing loss, including the philosophies of listening and spoken language, bilingual-bicultural or total communication. This study explored the frequency of use of sound field and FM technology in kindergarten classrooms, as well as the teachers’

perceptions of the equipment and their recommendations for its use. The majority of teachers completing the survey indicated that they indicated that the hearing assistive technology improved the students' academic performance, speech and language development, classroom behavior and attention. Teachers were required to rank the level of advantage on a 5-point Likert scale with 1 being no advantage and 5 being very advantageous. Teachers who reported using a soundfield FM system reported a considerable advantage of 4-5 on the Likert scale for increased student attention (84%), improved speech and language development (79%), improved academic performance (71%), and improved behavior (67%). Teachers who reported using a personal FM system in their classroom reported similar advantages for improved student attention (86%), improved speech and language development (78%), improved academic performance (71%), and improved student behavior (63%). Most of the teachers also reported they would recommend the use of a soundfield system (77%) or personal FM (71%) technology to other educators. Open-ended comments were encouraged and were grouped into four main categories, including 1) support for the technologies, 2) potential limitations, 3) logistical challenges, and 4) reasons these devices are not used in their classroom. Positive comments from teachers included "I like my system." Limitations included concerns for effectively using the devices with children with additional disabilities or appropriately addressing times the technology may not be helpful to the students, such as when children are rotating through activity or learning centers. Logistical challenges included funding concerns, trouble shooting assistive equipment

and technical problems such as static or interference in the building. Finally, responses suggested that this type of technology was not used in their program in a number of circumstances, including small class size, preferential seating being implemented and the use of voice-off ASL instruction. This study indicated that at least some teachers reported that the use of hearing assistive technology is beneficial to students with hearing loss in the classroom.

A study by Eriks-Brophy & Whittingham (2013) also explored teachers' perception of inclusion of children with hearing loss in the general classroom setting. Sixty three classroom teachers in Ottawa, Canada responded to a 60 item survey exploring their knowledge of hearing loss, their opinions of inclusion of students with hearing loss in general classrooms and their familiarity with hearing assistive devices (hearing aids, FM or other assistive listening devices). In general, respondents had positive attitudes toward including children with hearing loss in the mainstream setting. They also reported having knowledge about the effects of hearing loss on language and learning. While the teachers reported that they generally were confident in their abilities to teach these students in the general education setting, the majority indicated that their formal education had not included a sufficient amount of education about students with hearing loss in the classroom. This study further illustrated the need for communication and collaboration between audiologists and educators to provide additional information regarding the hearing impaired student and their specific needs for success.

The importance of classroom educator's role in the academic success of students with hearing loss has clearly been demonstrated. An estimated 87% of students with hearing loss will spend part of the day in a mainstream classroom (United States Department of Education, 2009) and without teacher cooperation a student with hearing loss may not achieve their potential being in their least restrictive environment. Teachers are expected to provide instruction that is tailored to students with disabilities, including those with hearing loss (Ohio Department of Education, 2005). However, it appears that teachers do not receive adequate education to prepare them for the specific needs of children with hearing loss in the classroom (Eriks-Brohpy & Whittingham, 2013).

## CHAPTER 3

### Methods

#### *Subjects*

This study was approved by the Institutional Review Board (IRB) of The Ohio State University. Subjects were teachers who were recruited via email addresses obtained through websites of school districts in Central Ohio. Schools were selected based on their districts being contracted for educational audiology services with the Ohio State University Speech-Language-Hearing Clinic. Recruitment emails were sent to 2,066 teachers grades K-8. Grades K-8 were selected due to the importance of implementing classroom modifications early in the educational process for academic success. The subjects were contacted initially via e-mail and asked to participate in the study. Two weeks later a reminder e-mail was sent to each teacher requesting their participation if they had not responded to the initial request. Teachers were only contacted twice during the process. No response from a teacher was considered denial to participate in the study. Both the initial recruitment email is included in Appendix A and the reminder email is included in Appendix B.

#### *Questionnaire*

A 35-item questionnaire was created through Surveymethods.com, a survey generating website. The survey questionnaire is in Appendix C. This questionnaire was used to obtain information about teachers' opinions, experience, and familiarity about the impact of hearing loss in the classroom. Questions regarding willingness to work with

students with hearing loss were also included. Questions included demographics such as the grade currently taught, degree, total years teaching and subjects currently being taught by each of the teachers. Information was also obtained to identify the teachers' experience and knowledge of hearing loss, familiarity with typical terms used in educational audiology, modifications made in the classroom, and willingness to work with hearing impaired children. All information remained confidential and the researcher was not able to link responses to individual participants.

A pilot survey was sent to five Central Ohio teachers to determine clarity and face validity of the survey. These teachers were sent an email requesting their participation with a link to the survey. They also provided input to the researcher via email response. Input from these teachers was used to edit and create the final version of the survey, found in Appendix C. Their responses were used for questionnaire design only and not included in the final statistical analysis.



## CHAPTER 4

### Results

#### *Background Information*

Of the 2,066 teachers who were invited to participate in the study, 134 responses were received and used in the final analysis, for a response rate of 6.5%. Based on survey software reports, time to complete the survey ranged from 51 seconds to four hours, sixteen minutes and 48 seconds, with the average completion time of 10 minutes. Responses from teachers indicated that the highest degree of education reported ranged from Bachelors of Sciences to Masters of Education and were obtained from 1972 to 2013. Of the 134 teachers who responded, 81% reported having a Masters degree, 18% reported earning a Bachelor degree and 1% reported earning a Doctorate degree. The average number of years teaching experience was 17.5, with a range of less than one year to 35 years experience. Teachers who responded to the questionnaire indicated that they currently taught grades Kindergarten through grade 8. All of the subjects were represented as some teachers reported teaching all subjects while others reported teaching specific subjects such as Science, Social Studies or Math.

#### *Experience/Knowledge of Hearing Loss*

Of the 134 teachers who responded, 75% reported that they had a personal experience with hearing loss (e.g. family member, friend, etc.). Fifteen percent of teachers reported having formal education about hearing loss, responding either “yes” to the question or indicating that they had “some” education in that area (Figure 1). Of

those teachers, 46% reported gaining education during their undergraduate program, 21% during their graduate program, 16% through a seminar or continuing education course, and 17% through “other” sources such as other professionals (Figure 2). Although a small percentage of teachers reported having formal education related to hearing loss, 64% of teachers reported having experience teaching students with hearing loss. The majority of teachers reporting experience teaching students with hearing loss reported they had taught 1-5 children with hearing loss (97%) for a period of 1-5 years (87%). Fifty-four percent of teachers responded that they had experience with amplification (e.g. hearing aids, cochlear implants, personal or soundfield systems). Many of the teachers (32%) reported being instructed on these devices by a speech-language pathologist at their schools. Teachers were slightly less likely to get information from an audiologist (15%) as they were to get information from another teacher (19%) or parent (19%).

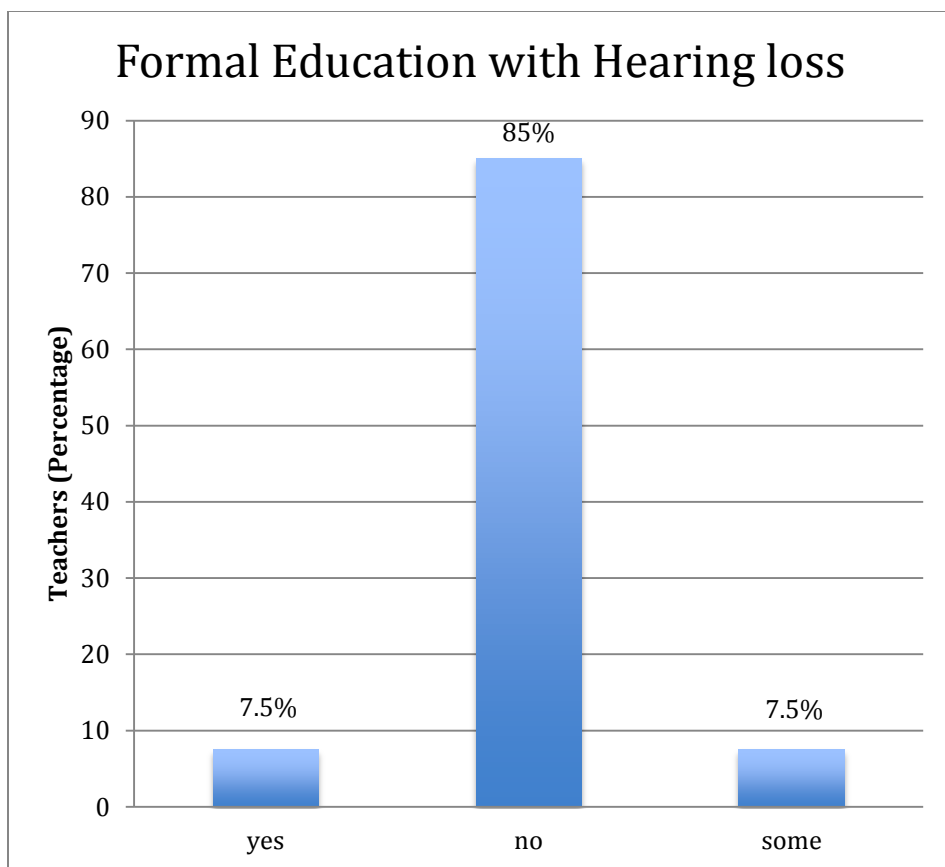


Figure 1. Percentage of Teachers with Formal Education about Hearing Loss

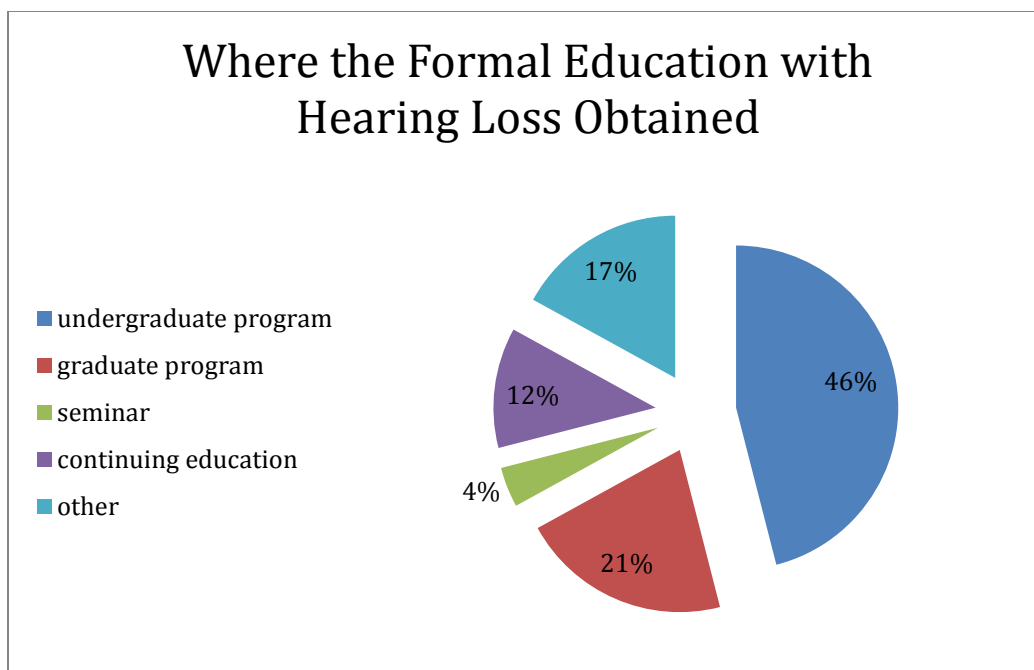


Figure 2. Where Teachers obtained Formal Education about Hearing Loss

### *Familiarity*

Teachers reported familiarity with many of the basic aspects of childhood hearing loss that were included in the questionnaire. Seventy-eight percent of the respondents reported being “familiar” or “somewhat familiar” with school hearing screenings for identification of potential hearing loss. The majority (77%) also reported being “familiar” or “somewhat familiar” with amplification devices and 83% reported being at least “somewhat familiar” with the term “hearing loss”. Sixty-five percent reported being “familiar” or “somewhat familiar” with the possible negative outcomes of childhood

hearing loss on education and 77% reported being familiar with possible causes of hearing loss.

Many aspects of educational audiology related to children with hearing loss in the typical classroom were not familiar to teachers based on their survey responses. The majority of teachers were not familiar with the impact of classroom acoustics on listening (60%), the concept of signal-to-noise ratio (90%), reverberation time (88%), how to trouble shoot amplification devices (83%), hearing loss management/treatment (60%) and auditory processing disorders (56%).

### *In the Classroom*

Teachers were also asked about classroom accommodations for children with hearing loss, probing if they knew what appropriate accommodations might include when working with children with hearing loss. Fifty-three percent reported that they had no knowledge of making appropriate accommodations to address the needs of a child with hearing loss in the classroom. Those who reported having knowledge of accommodations reported learning of this information in a variety of ways, including in a graduate school course (35%), from a speech-language pathologist (24%), from a family of a student with hearing loss (17%), and from other teachers (24%). Preferential seating was reported to be used by 67% of teachers at least some of the time and other non-specific accommodations for students with hearing loss were reported by 62% of respondents. While teachers were not asked to report “other” accommodations it is likely that they include use of FM systems, pre-teaching or shared notes between students.

Also, twenty-six percent of teachers surveyed reported that there are additional accommodations they would like to make but are unable to do so. Teachers were not asked to report accommodations they make or additional accommodations they would like to make. Eighty-five percent of responses indicated that in-service training about hearing loss and focused on children with hearing loss in the classroom would be beneficial to them (Figure 3). However, 50% of responses indicated that teachers were “unsure” if they would attend, while 7% reported they “would not” and 43% reported that they “would” attend (Figure 4).

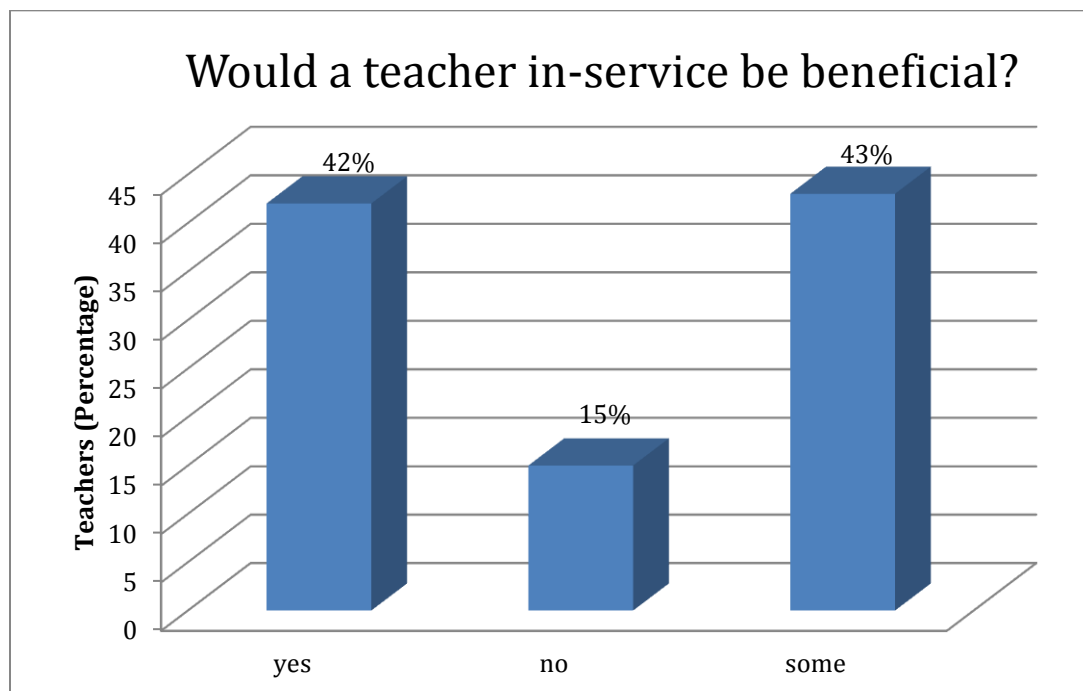


Figure 3. Percentage of Teachers Responding that In-Service Training about Hearing Loss Would Be Beneficial

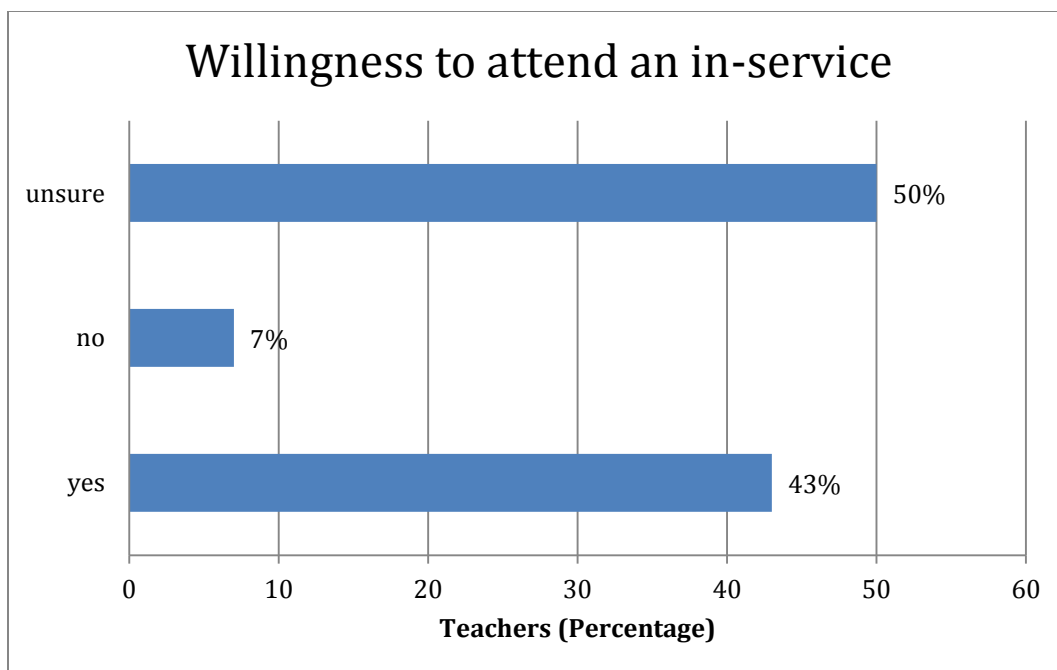


Figure 4. Willingness to Attend a Teacher In-Service about Hearing Loss

#### *Willingness to Work with Children with Hearing Loss*

A significant majority of teachers (91%) reported that they would be willing to work with a child with hearing loss, while 7% reported they would possibly be willing and 2% were unsure (Figure 5). None of the teachers responded “No” to this question. Ninety-eight percent reported being willing to make accommodations for a child with hearing loss and 2% responded with “maybe” (Figure 6). In addition, 94% would be willing to wear a device to promote listening for a student in the classroom. Again, there were not any “No” responses to this question.

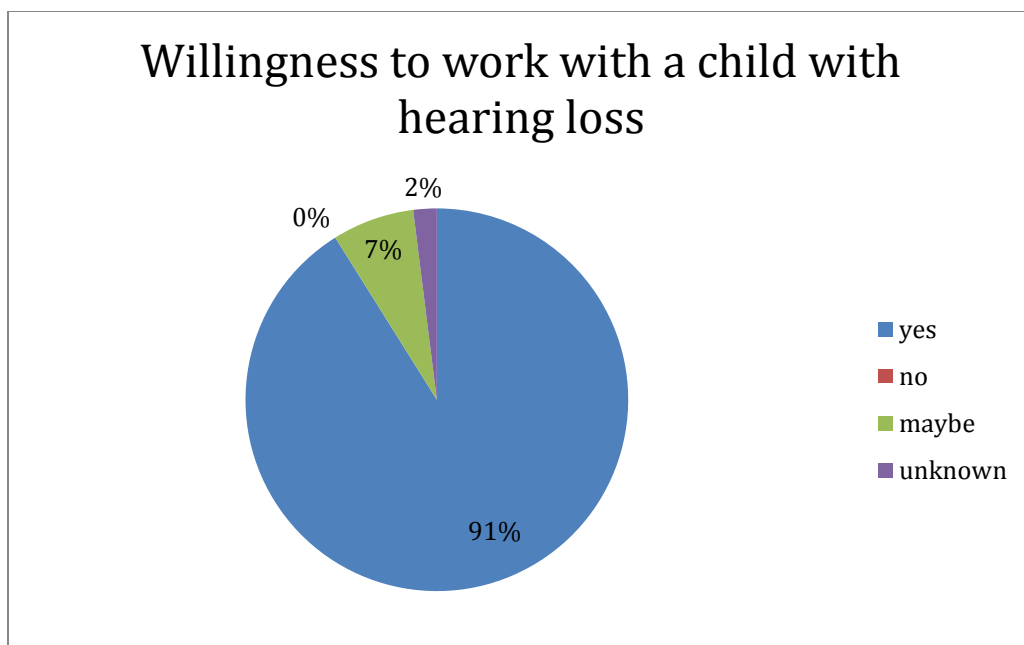


Figure 5. Willingness to Work with Children with Hearing Loss



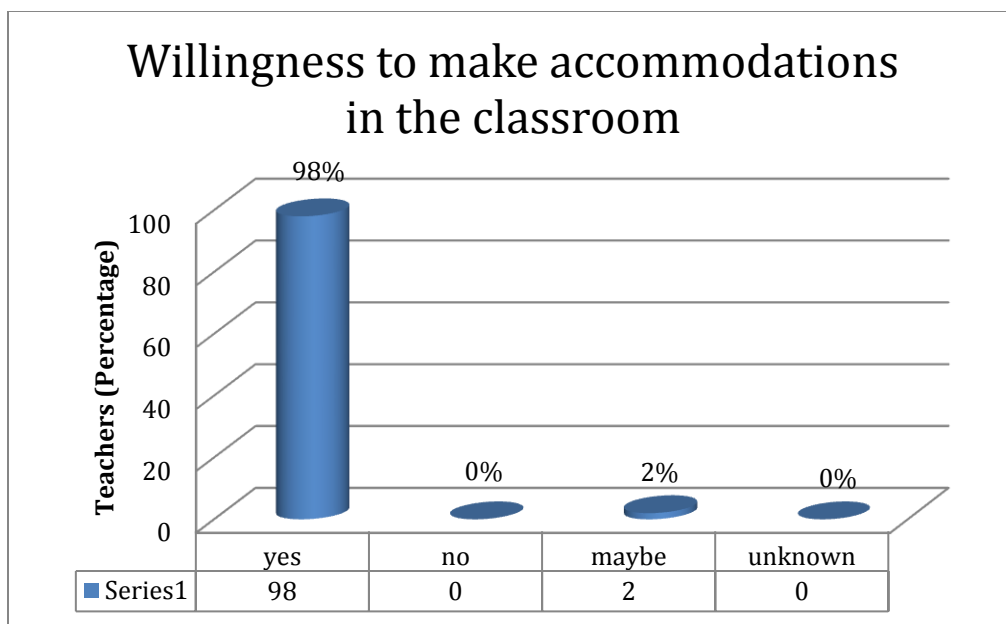


Figure 6. Willingness to Make Accommodations for Children with Hearing Loss in the Classroom

*Comparison of Responses from Teachers with Bachelor and Master Degrees*

Of the 134 teachers who responded, 81% reported having a Master's degree and 18% reported earning a Bachelor degree. The majority of both teachers with a Bachelor's degree (76%) and teachers with a Master's degree (87%) reported not receiving formal education about children with hearing loss. Those who did report receiving formal education reported receiving it from their educational coursework, with 83% of teachers with a Bachelor's degree and 85% of teachers with a Master's degree. Experience with amplification (hearing aid, cochlear implant or FM) was reported by about half of each group with 56% of teachers with a Bachelor's degree and 44% of

teachers with Master's degrees reporting experience with amplification. Differences were not noted in the mode of instruction of these devices. The majority of teachers who responded reported that an in-service provided to them with information about children with hearing loss would be at least "somewhat beneficial" (96% of teachers with a Bachelor's degree and 84% of teachers with a Master's degree). Many of the respondents reported willingness to attend such an in-service to obtain additional information about children with hearing loss (36% of teachers with a Bachelor's degree and 45% of teachers with a Master's degree). Nearly all of the teachers who responded reported being willing to work with a student with hearing loss, 92% of teachers with a Bachelor's degree and 93% of teachers with a Master's degree.

## CHAPTER 5

### Discussion

The purpose of this study was to determine classroom teachers' knowledge of and experience with students with hearing loss. More specifically, the questionnaire used in this study was created to determine if teachers received formal education regarding students with hearing loss and if so where they receive this education. Also, questions were included to determine teacher familiarity with aspects of hearing loss and listening in the classroom for children with hearing loss. Finally, questions were included regarding teacher willingness to work with children with hearing loss and obtain additional training or information about children with hearing loss through teacher in-service. The responses obtained from the survey are important because they provide insight into teacher knowledge and experience with children with hearing loss. The insight obtained could provide avenues for future collaboration between educational audiologists and educators of children with hearing loss to provide these students with an environment supportive of their academic needs.

In general, teachers surveyed in this study reported a lack of formal education in the area of childhood hearing loss, although they did report having some knowledge of hearing loss obtained informally from interactions with speech-language pathologists, other teachers, parents and audiologists. These results are consistent with those reported by Blair et al. (1999) that surveyed teachers regarding sources of information for their students with hearing loss. In that study, teachers selected all sources that provided

information and reported receiving information from audiology reports (57%), speech-language pathologist or other school personnel (43%) and parents (29%).

In the current study, teachers reported a lack of familiarity with classroom characteristics that might interact with the presence of hearing loss in the classroom (familiarity with classroom acoustics, signal-to-noise ratio and reverberation time). In contrast, many teachers reported being at least “somewhat familiar” with school screenings for hearing loss, amplification devices, negative outcomes of childhood hearing loss and causes of childhood hearing loss. The vast majority of teachers reported that they were willing to work with students with hearing loss in the classroom environment and make accommodations necessary for their students to succeed. The majority of teachers also reported being willing to obtain additional information in the form of in-services training to teachers provided by audiologists. Differences were not noted in many of the responses obtained when comparing teachers with Bachelor’s degrees and Master’s degrees, including formal education with hearing loss, experience with amplification, willingness to obtain additional education through an in-service training and willingness to work with children with hearing loss. These responses are promising to the audiology community and to the academic outlook for students with hearing loss because teachers reported being willing to work with students with hearing loss and many reported being willing to attend an in-service to obtain more information about children with hearing loss. Well-informed teachers will be more prepared to make

the appropriate accommodations for students with hearing loss and facilitate their academic success.

The responses obtained from this survey are important because teachers play such a vital role in the successful education of students with hearing loss. Their education regarding hearing loss and classroom acoustics is related to their ability to provide appropriate accommodations and the most effective methods of education to children with hearing loss. Teachers were asked about their familiarity of concepts regarding classroom acoustics, including signal-to-noise ratio, and reverberation time. These are key concepts regarding classroom acoustics that can negatively impact the quality of listening a child may experience in the classroom. Classroom acoustics have an impact on all children in the classroom, especially for those with hearing loss. Poor signal-to-noise ratio from elevated background noise can significantly impair a student's ability to understand speech, especially for a child with hearing loss (Crandell & Smaldino, 2000). When children do not understand instruction, they will have increased difficulty learning new concepts. The necessity to provide an acoustically favorable listening environment is one of the key concepts to the educational needs of children with hearing loss.

The educational needs of children with hearing loss necessitate accommodations to support listening and learning needs in the classroom and specific accommodations have been suggested. For example, the use of assistive technology, such as FM systems in the classroom, has been shown to promote academic success for students with hearing loss (Anderson et al., 2005; Thibodeau, 2010). These accommodations will not be

successful for students without the knowledge and skill of the classroom teacher being able to use an FM system. If a student has an FM system available but the teacher fails to wear the microphone the child will not receive the possible benefit from the device.

There may be a number of reasons that a teacher does not use assistive technology for children with hearing loss, such as forgetting to wear the device or forgetting to turn the device on. However, the proper use of these devices is instrumental to the benefit of the children using them.

While the responsibility for use of the FM system certainly lies in the hands of the educator, teachers will need specific instruction in the use and care of the system to insure the device is being utilized correctly and appropriately. Similarly, the classroom teacher may require specific instructions on implementation of techniques to improve classroom acoustics. If teachers in the mainstream classroom environment are willing to work with and obtain additional information about students with hearing loss but are not receiving adequate information during their education, the question of who will educate them must be addressed. This responsibility is within the scope of practice of educational audiologists.

The need for educators to be provided with information surrounding hearing loss and children with hearing loss could be met by educational audiologists. Many children with hearing loss will be in the mainstream classroom with necessary accommodations for their academic growth (IDEA, 2004; No Child Left Behind, 2001; Section 504 of the Rehabilitation Act of 1973; Americans with Disabilities Act, 1990). These children have

the right to an education in their least restrictive environment and while teachers are charged with differentiating education for children with disabilities, including hearing loss, teacher training may not adequately prepare these educators for these responsibilities. This gap could be bridged by information provided to teachers of children with hearing loss by educational audiologists. The Educational Audiology Association provided details for the practices of audiology in educational settings placed by IDEA, 2004 (EAA, 2009). Among duties of identification and management of hearing loss, educational audiologists participate in the provision of habilitative activities (language, auditory training, speech reading, hearing evaluation and speech conservation) by measuring progress, training school personnel and participating in the development and implementation of Individualized Education Plans (IEPs). Educational audiologists are also responsible for providing counseling and guidance for children, parents and teachers. This includes informational and affective counseling for individuals who could be in contact with the child with hearing loss in the classroom and assistance for transitioning from one grade or school to another. Finally, the process of selecting, fitting and determining effectiveness of amplification is also within the scope of practice of the educational audiologist, including participation in measurement of classroom acoustics and instruction for teachers with assistive technology. It is clear that educational audiologists have the skills necessary to collaborate with educators for the academic success of children with hearing loss. With the guidance and support of educational audiologists, teachers can be provided with the necessary tools and education

to make the appropriate accommodations for children with hearing loss. Continued collaboration between educators and educational audiologists can lead to academic success for children with hearing loss in the classroom.

Future collaboration between educational audiologists and educators could create a standard for communication between the professions. For example, a standard set of information such as STAR-IT, a six-step program focused on improving the listening environment for students with hearing loss, could be provided to each educator working with a student with hearing loss (Schafer & Sweeney, 2012). The steps in the STAR-IT program included daily sound checks of hearing aids, cochlear implants and FMs, trouble shooting for devices found to be malfunctioning, use of assistive listening technology in the classroom, implementation of classroom modifications, information sharing by professionals, and treatment goals that optimize classroom performance. Some recommended modifications included preferential seating, confirming student comprehension, additional written instructions, note sharing between the child with hearing loss and another student, and reduction of ambient noise. Audiologists could provide teachers of students with hearing loss with a standardized program such as STAR-IT to encourage appropriate classroom appropriate accommodations in the classroom.

The possibility of a teacher's inability to provide such accommodations for children with hearing loss must be considered. Interestingly, 26% of teachers surveyed reported that there were accommodations that they would like to make for students with



hearing loss but were unable to implement them. While details regarding why these accommodations could not be made were not obtained during this survey, it is possible that the reasons include financial and time constraints, space limitations, or limited staff available to implement desired accommodations. It is also possible that teachers were aware that there was more to be done however were unaware of how to implement the accommodations.

### *Limitations*

There are a number of limitations to the study that must be discussed. First, teachers completed the survey anonymously and the resulting responses could not be confirmed for accuracy. For example, teachers may have responded that they would be willing to work with students with hearing loss because it seems to be the right thing to do and are mandated to work with students with disabilities under IDEA (Salathiel, Steele, & Edwards, 2010). However, the anonymous aspect of this survey could be representative of the truthful responses of the teachers because they responded they would be willing to work with students when they had the option to respond “no” without ramifications.

In addition, the results obtained in this study may be difficult to generalize due to the limited number of responses and the limited geographic area represented by the respondents. The response rate of this questionnaire was only 6.5% which is considerably smaller than previous studies with questionnaires distributed to teachers asking about their knowledge of, experience with, or attitudes towards aspects regarding

students with hearing loss. Blair et al. (1999) had a response rate of 63%, Eriks Brophy and Whittinham (2013) had a response rate of 63% and Nelson et al. (2013) had a response rate of 32%. The small response rate could be due to the method of delivery. The three previous mentioned studies all used paper delivery while this questionnaire was delivered electronically. Teachers may be more likely to respond to a request mailed to them rather than e-mailed to them. It would be interesting to determine if the same response rate would be observed with a questionnaire in paper format instead of electronic format. Nulty (2008) reported a trend in research of surveys from academic review from college students of lower response rates for electronic delivery of survey questionnaires when compared to paper delivery methods. Also, the survey was only distributed to teachers in central Ohio so the results may be difficult to generalize to other areas of the country. Teachers in different areas may have provided different responses based on educational or state requirements/standards. Future research should include teachers from other regional areas.

Statistical analysis of the results of this survey could have strengthened the study as well. For example, teachers could have been grouped by demographic information such as years teaching or experience with students with hearing loss and compared to determine factors that may make a teacher more likely to be willing to work with students with hearing loss or obtain additional information through an in-service seminar about hearing loss.

### Future Directions

Some of the teachers (26%) that responded reported that there were additional accommodations they would like to make but that they could not make them. Future research should investigate what accommodations teachers actually make as well as additional accommodations they would like to make and compare these to the accommodations required by a child's IEP or 504 plan which are mandated accommodations. It would also be very interesting to ask why they are unable to make some of the accommodations they would like to make. While it is assumed that financial and time constraints are likely factors, it could be beneficial to learn why teachers reported they could not make the accommodations they would like. Possible solutions could arise from such a study and teachers could possibly make additional accommodations to promote academic success for children with hearing loss. This could be a critical component since teachers are on the forefront of working with students with hearing loss in the classroom and have unique insight into their needs.

Nearly half of the teachers that responded reported that in-service training about hearing loss would be beneficial and they would attend. A future study could provide such an in-service training to teachers and use a pre- and post-questionnaires similar to the one used in this study to measure the effectiveness of the training. Additionally, the questionnaire could include questions inquiring about the teachers' comfort level with providing appropriate accommodations and listening strategies for students with hearing loss. It would be interesting to see if teachers were more effectively able to provide

accommodations for students with hearing loss after an in-service training about hearing loss and classroom modifications.

Future research should explore methods that would be effective to provide teachers with the resources necessary to implement appropriate accommodations for children with hearing loss. With research regarding what teachers know about students with hearing loss, what they are doing to accommodate for these students, and what they would like to be able to provide students in the classroom, the audiology community can strive to develop protocols and methods to provide teachers with adequate resources for working with students with hearing loss in the classroom.

### Summary

The results of this study indicated that teachers do not generally receive specific education regarding working with children with hearing loss. The majority of teachers who did have education obtained it from schooling or continuing education/seminars. The majority of educators surveyed did not have familiarity with classroom acoustics, signal-to-noise ratio, reverberation time, troubleshooting for devices, hearing loss treatment/management techniques and auditory processing disorder. The majority also reported not receiving education for possible accommodations for students with hearing loss. However, this lack of education/knowledge did not appear to be the result of a lack of desire to have such knowledge. Many of the educators who were surveyed reported being willing to participate in in-service or continuing education that could provide further information that would support their knowledge and skills in working with

students with hearing loss. The majority of teachers reported that such a seminar would be at least somewhat beneficial to them. Nearly all respondents reported a willingness to work with children with hearing loss and make accommodations for them, including wearing a device to assist with listening for the child.

The responses obtained in this study are considered to be true and valid responses as the respondents had the option to anonymously select that they would not be willing to do such things. The responses open an avenue for educational audiologists to provide additional information and resources to teachers to promote appropriate accommodations, resulting in greater possibility of academic success for students with hearing loss. With appropriate education and training, teachers are also better prepared to more effectively advocate for students with hearing loss.

### Conclusion

The majority of teachers who participated in this survey reported being at least “somewhat familiar” with common aspects of issues related to hearing loss in school aged students such as hearing screenings for identification of potential hearing loss, use of amplification devices, negative outcomes of childhood hearing loss and causes of childhood hearing loss. Teachers in the study indicated that they were generally “not familiar” with other key concepts such as classroom acoustics, signal-to-noise ratio and reverberation time. This information reflects the lack of coursework or information provided to regular education teachers regarding children with disabilities, even if coursework addresses hearing loss, it is likely to be more of an overview rather than

detailed information. The concepts that teachers reported as familiar could also be ones that they are more likely to encounter in their typical classroom career. For example, they are likely to learn of school hearing screenings, as all children participate in the screenings in every school building every year, therefore it applies to students in the general education curriculum.

Although many of the teachers who responded in the survey reported a lack of education in some aspects about which they were surveyed, the overall positive attitude noted regarding working with children with hearing loss was promising. These results suggested that educational audiologists could provide information and guidance to educators to positively impact the children both professionals work to provide support. Perhaps continuing education hours or seminars could be offered to local schools by educational audiologists to promote the education of teachers regarding instruction of children with hearing loss in the mainstream classroom and encourage a collaborative effort between the professions for the academic success of students with hearing loss.

Additional solutions to the lack of teachers' education about hearing loss could be created as well. Certainly, teacher preparation programs (both Bachelor's and Master's degree) could include more detailed instruction regarding students with hearing loss and the necessary accommodations to promote their success in the academic environment. Another possible solution could include participation from the child's clinical or private audiologist, in which the audiologist provides the child's school and teachers with information about his/her hearing loss and accommodations that should be made.

Clinical or private audiologists may not be providing this information currently because they assume the teacher is prepared to make the appropriate accommodations for the student with hearing loss. Professional student groups such as the Student Academy of Audiology could also be a potential source to provide information to educators regarding children with hearing loss. With additional education or training from people such as audiologists or students, teachers could be better prepared to make appropriate accommodations for students with hearing loss in the classroom.

Interestingly, differences were not noted in responses from teachers based the degree they had obtained (Bachelor's or Master's degree). However, these results should be interpreted with caution as the groups did not have an equal number of respondents (81% of respondents reported earning a Master's degree and 18% reported earning a Bachelor's degree). Many teachers obtain a Master's degree in Education to meet the licensure requirements for Senior or Lead Professional Educator (Ohio Department of Education, 2013). The results obtained in this study indicated that additional education (Master's degree) does not appear to provide additional information to teachers about students with hearing loss when compared to teachers with a Bachelor's degree.

Audiologists and teachers share a common goal for students with hearing loss to succeed. The information obtained from this study indicated that with some additional education or training on amplification devices and troubleshooting those devices, teachers may be more prepared to teach students with hearing impairment. Though this questionnaire did not probe into this aspect of preparedness and comfort with teaching

students with hearing loss, it is presumed that additional training would promote a higher level of comfort with accommodations for students with hearing loss. That is not to say that they are not already prepared and willing to make accommodations. While teachers appeared to be willing to make the accommodations, the need for education exists as seen in this survey and previous studies (Blair et al., 1999, Richburg & Goldberg, 2005, Eriks-Brophy et al., 2013, and Nelson et al., 2013). Additionally, technology is constantly changing and teachers could benefit from updated information with the latest technology available to students with hearing loss. With additional education about children with hearing loss and the appropriate classroom accommodations that can help them succeed, teachers could provide an environment that is favorable to students with hearing loss and ultimately help them to achieve academic success.



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## Appendix A: Recruitment E-mail

Good Morning/Afternoon/Evening,

My name is Danyelle Hayes and I am a third year graduate student at the Audiology program at The Ohio State University. For my capstone project, I am conducting a survey regarding mainstream teachers and their experiences with hearing impaired students. The survey contains simple questions about teacher thoughts, opinions and insight of students with hearing loss. The survey should only take 10-15 minutes. Your responses play a critical role in my research of the necessary collaboration of teachers and audiologists to promote academic success for children with hearing loss. Your participation is voluntary and all responses will be kept confidential. For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251. If you have any questions regarding this survey please contact me at hayes.668@osu.edu. Thank you for your time and participation!

Please click on the provided link to take the survey. Your participation is greatly appreciated!

Thank you,  
Danyelle Hayes

## Appendix B: Reminder E-mail

Good Morning/Afternoon/Evening

My name is Danyelle Hayes and I am a third year graduate student at the Audiology program at The Ohio State University. I recently contacted you to request your participation in a survey regarding mainstream teachers and their experiences with hearing impaired students. I am contacting you again to request your participation in this survey. If you have already completed the survey, thank you for your participation! If you have not completed the survey yet, please take 10-15 minutes to fill out the simple survey. Your responses will play a critical role in my research of the necessary collaboration of teachers and audiologists to promote academic success for children with hearing loss. Your participation is voluntary and all responses will be kept confidential. For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251. If you have any questions regarding this survey please contact me at hayes.668@osu.edu. Thank you for your time and participation!

To take the survey, please click on the link. Your participation is appreciated!

Thank you,  
Danyelle Hayes

## Appendix C: Survey

### SURVEY FOR TEACHERS CHILDREN WITH HEARING LOSS

#### BACKGROUND INFORMATION:

Highest degree achieved: \_\_\_\_\_

Year degree achieved: \_\_\_\_\_

Total years teaching: \_\_\_\_\_

Grade(s) currently teaching: \_\_\_\_\_

Subject(s) currently teaching: \_\_\_\_\_

#### EXPERIENCE/KNOWLEDGE OF HEARING LOSS

Experience with anyone with hearing loss (family, friend...) ☐ Yes ☐ No

Formal education about children with hearing loss? ☐ Yes ☐ No ☐ Some

*If yes, where?*

☐ School ☐ Graduate School ☐ Seminar ☐ Continuing Education ☐ Other

Experience teaching children with hearing loss: ☐ Yes ☐ No

*If yes, how many years?* ☐ 1-5 ☐ 6-10 ☐ More than 10

*If yes, how many total children?* ☐ 1-5 ☐ 6-10 ☐ More than 10

Experience with amplification (hearing aid, cochlear implant, soundfield FM):

☐ Yes ☐ No

*If yes, how were you instructed on this device?*

☐ Teacher ☐ Parent ☐ Speech Language Pathologist ☐ Audiologist ☐ Other

#### FAMILIARITY

Are you familiar with the following?

School screening for hearing loss: ☐ Yes ☐ No ☐ Somewhat



Classroom acoustics:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat
Signal-to-noise ratio:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat
Reverberation time:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat
Amplification devices:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat
Amplification device troubleshooting:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat
Hearing loss:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat
Negative outcomes of childhood hearing loss:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat
Causes of hearing loss:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat
Hearing loss management/treatment:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat
Auditory Processing Disorder:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Somewhat

### **IN YOUR CLASSROOM**

Were you taught ways to accommodate for children with hearing loss?

☐Yes ☐No ☐Some

*If yes, by who? \_\_\_\_\_*

Do you use preferential seating for children with hearing loss?

☐Yes ☐No ☐Some

Do you make any specific modifications for children with hearing loss?

☐Yes ☐No ☐Some

Are there any accommodations you would like to make but are unable?

☐Yes ☐No

Do you feel that a teacher in-service about hearing loss and children with hearing loss would be beneficial to you?

☐Yes ☐No ☐Some

*If such a seminar were offered, would you attend? ☐Yes ☐No*

**WILLINGNESS TO WORK WITH CHILDREN WITH HEARING IMPAIRMENT**

Would you be willing to work with a child with hearing loss?

☐Yes ☐No ☐Maybe ☐Unknown

Would you be willing to make accommodations for a child with hearing loss in your classroom?

☐Yes ☐No ☐Maybe ☐Unknown

Would you be willing to wear a device to promote listening for a child with hearing loss?

☐Yes ☐No ☐Maybe ☐Unknown

Would you be willing to obtain additional education (a short seminar) to learn more about children with hearing loss?

☐Yes ☐No ☐Maybe ☐Unknown